Toxic Industrial Chemicals (TICs) and Toxic Industrial Materials (TIMs)

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Purpose

To inform the Army's future Chemical Officers about TICs and TIMs and provide the necessary tools to execute the war time mission in this environment.

Terminal Learning Objective

Task: TICs and TIMs on the battlefield

Conditions: Given the classroom environment

Standards: Understand definitions, effects, resources, and actions to take for TICs and TIMs

Enabling Learning Objectives

(1 of 2)

- ELO 1- Definitions
  - TIC
  - TIM
- ELO 2- IPB
  - AO Infrastructure
- ELO 3- Key Indicators
- ELO 4- Common Effects

Enabling Learning Objectives

(2 of 2)

- ELO 5- Mask Limitations
- ELO 6- Detectors
- ELO 7- Immediate Action
- ELO 8- Resources Available

ELO 1

- Task: Definitions
- Conditions: Given the classroom environment
- Standards: Understand definitions of TICs and TIMs

Toxic Industrial Chemicals

ITF-25 defines a TIC as a material produced in quantities of greater than 30 tons in a single facility and has a toxicity (LCt 50 inhalation) of less than 100,000 Mg per min/M3 and an appreciable (undefined) vapor pressure at 20C.

Toxic Industrial Chemicals

Any chemical substance that can render troops ineffective under normal MOPP conditions. Primarily an inhalation hazard but troops can receive a dosage through ingestion or absorption of the skin.

Toxic Industrial Materials

Any substance that in a given quantity produces a toxic effect in exposed personnel through inhalation, ingestion, or absorption.

Examples of TICs and TIMs

- Fuels
- Oil
- Pesticides
- Acids and Bases
- Radiation Sources
- Fertilizers
- Arsenic
- Cyanide
- Metals (Mercury & Thallium)
- Phosgene

TICs/TIMs vs. CW Agents

TICs/TIMS

- Inhalation Hazard
- Ingestion Hazard
- Skin Contact Hazard
- **Inexpensive**
- **May defeat masks**
- **Detection is Limited**
- Chronic and/or Acute effects

CW Agents

- Inhalation Hazard
- Ingestion Hazard
- Skin Contact Hazard
- **Known Threat**
- **Designed to create Casualties**
- Primarily acute effects

ELO 2

- Task: Intelligence Preparation of the Battlefield (IPB)
- Conditions: Given the classroom environment
- Standards: Integrate TICS and TIMS into the IPB process and give accurate advice to the commanders in regards to hazards

IPB

Why is IPB Important?

- It saves lives.
- It saves time.
- **Gives the commander a clear picture of battlefield.**

IPB

Why use industrial chemicals as WMDs?

- **Accessible**
- Volume offsets lower toxicity
- **Multiple hazards**
- Easier to steal industrial chemicals than to make military agents
- Security & binary storage of military agents discourages theft

IPB

- Area of Operations Research
  - Economics (Infrastructure)
  - Factories, Textiles, and Chemical Plants
- Consider Chemicals with Acute Inhalation Effects (i.e.. Carbon Disulfide and Chlorine)
- Consider Materials with Chronic Effects (i.e.. Some Pesticides and Radiation Sources)

IPB

- Vulnerability Analysis
  - How susceptible is your unit to exposure?
  - Is your unit prepared for potential exposure?
- Contamination Avoidance
  - R & S Plan (NAIs)
  - Clean and Dirty Routes

IPB

- Evaluate the Threat
  - Does the threat have the capability?
  - Does the threat have a delivery means?
  - What is the likely hood of use?
  - Economy (low or high budget)
- Conduct Risk Assessment (Record)

ELO 3

- Task: Key indicators
- Conditions: Given the classroom environment
- Standards: Identify sources and potential sources of TICs and TIMs within your AO

Key Indicators

- Intelligence (S2)
  - INTSUMS
  - Reconnaissance Reports
- Local Population and Government Actions
- Sudden Force Degradation
  - Battalion Aid Station Reports
  - Unit Spot Reports

Key Indicators

- TICs and TIMs Characteristics
  - Strong Odor
    - Pungent
    - Sweet
  - Color
    - Green
    - Yellow
    - Haze/Cloudy
    - Red

ELO 4

- Task: Common effects on soldiers
- Conditions: Given the classroom environment
- Standards: Identify common effects and dangers which can occur from exposure

Common Effects

- Acute Effects
  - Moderate to Extreme Headaches
  - Nausea
  - Respiratory Failure
  - “Dry Land Drowning”
  - Oxygen Displacement
  - Temporary or Instant Blindness

Common Effects

- Chronic Effects
  - Tumors (Malignant or Benign)
  - Blood Poisoning
  - Respiratory Inhibition
  - Leukemia
  - Sterility
  - Permanent Blindness

ELO 5

- Task: Mask Limitations
- Conditions: Given the classroom environment
- Standards: Understand that the common M40 protective mask does not protect against certain TICS and TIMS

Mask Limitations

- BLUF- M40 Series Mask provide poor to medium protection against TICs/TIMs

- Reference; Toxic Industrial Chemicals Assessments of NBC Filter Performance, Edgewood Chemical Biological Center

Mask Limitations

- Filter Performance Measured by:
  - Effective- Saturation Pressure is less than 10 mm Hg at 25 C
  - Marginal- Saturation Pressure from 10 to 100 mm Hg at 25 C
  - Poor- Saturation Pressure above 100 mm Hg at 25 C

Mask Limitations

- Some chemicals decompose Carbon faster than others
- Chemicals with a Molecular Weight of < 29 will pass through filter

ELO 6

- Task: Detectors available
- Conditions: Given the classroom environment
- Standards: Know detectors available and their limitations

Detectors

- Limited research has been done
- M93A1 FOX
  - Limited can have the Enviro Chip uploaded
  - M21 will not detect
- M22 ACADA
  - Will not detect
- ICAM/CAM
  - Will not detect

ELO 7

- Task: Immediate action
- Conditions: Given the classroom environment
- Standards: Be aware of surroundings and be prepared to advise the commander when the situation arises

Immediate Action

- Research (IPB)
  - Know What To Look For
- Collect Information
  - Spot Reports
  - BN Aid Station
- Assess the Situation
  - ID Problem
  - Tentative Plan

Immediate Action

- Consult Resources and Unit SOP
- Consult Risk Assessment
  - Advise the Commander; ask for Guidance
- Implement Commander's Guidance
  - Assume MOPP4
  - Tend To Any Casualties
  - Move out of the Hazard Area
  - Prepare for Follow-On Mission

Immediate Action

- Mark the Area (If Applicable or Practical)
  - Unit SOP
  - Eight Digit Grid
- Report to your Higher Command

ELO 8

- Task: Resources available
- Conditions: Given the classroom environment
- Standards: Understand which resources are available to assist in identification and immediate action procedures

Resources Available

- ITF-25 (International Task Force 25, Hazards from Toxic Industrial Chemicals, April 1998)
- 2000 North American Emergency Response Handbook
- NIOSH Pocket Guide

Resources Available

- JWARN (will contain a database for common chemicals)
- MSDS
- TG 230 A Exposure Levels
- Toxic Industrial Chemicals Assessment of NBC Filter Performance- Edgewood Chemical Biological Center

Summary

Questions

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Conclusion